

REMARKS

Claims 1, 3-10, 21, 23, 25 and 27-30 are pending. By this Amendment, Claims 2, 22, 24 and 26 are canceled and Claims 1, 3, 10, 23, 27 and 30 are amended.

Reconsideration of the September 23, 2002 Official Action is respectfully requested.

Applicants respectfully request entry of the amendments because the amendments (a) do not raise new issues that would require further consideration and/or search; (b) do not raise the issue of new matter; (c) do not present additional claims without canceling a corresponding number of finally rejected claims; and (d) place the application in better form for appeal. The issues regarding the thickness of the electrode were previously raised in the Official Action. Furthermore, as explained below, Claim 1 has been amended to include subject matter previously claimed and considered by the Patent Office. Claims 3, 10, 23, 27 and 30 have been amended to be consistent with amended Claim 1.

Applicants thank Examiner Alejandro Mulero for the courtesies extended to Applicants' undersigned representative during the October 17, 2002 personal interview. The substance of the interview is incorporated in the following remarks.

Claim 24, which stands withdrawn from consideration as being directed to a non-elected invention, has been canceled.

Claims 1-10, 21-23 and 25-30 were rejected in the Official Action under 35 U.S.C. § 112, first paragraph. The reasons for the rejection are stated at pages 2-3 of the Official Action. Claims 2, 22 and 26 have been canceled. The rejection is respectfully traversed for the following reasons.

Claim 1 has been amended to incorporate the features of Claims 2 and 30. Claim 1, as amended, recites "the electrode having a thickness of about 0.3 inch to 0.5 inch". Support for this recitation is clearly provided at page 13, lines 15-21 of the specification. The specification discloses that the low resistivity electrode can reduce center-to-edge temperature variation across the electrode, thereby providing better process uniformity. The specification further discloses that one approach for enhancing reduction of the center-to-edge temperature variation across the electrode is "by making the electrode thicker than conventional electrodes" (emphasis added). A "conventional 0.25 inch thick electrode" (emphasis added) is described at page 13, line 21. Thus, the specification discloses that the electrode can be made thicker than a conventional 0.25 inch thick electrode in order to enhance reduction of the center-to-edge temperature variation across the electrode. As described at page 13, lines 19-20 of the specification, the thickness of the electrode can be, for example, 0.375 inch, or even 0.50 inch. Accordingly, Applicants have provided a written description of an electrode having a thickness greater than 0.25 inch and have given a specific example of a 0.5 inch thickness. Thus, Applicants are entitled to claim an electrode thickness range of greater than 0.25 inch to 0.5 inch.

As explained in MPEP § 2163.02, a specification complies with the written description requirement of 35 U.S.C. § 112, first paragraph, when the specification conveys with "reasonable clarity" to those skilled in the art that, as of the filing date of the application, the applicants were in possession of the invention claimed. It is further explained that the subject matter recited in a claim need not be described literally (i.e., verbatim) in the specification in order for the disclosure to satisfy the written description

requirement. Thus, there is no requirement that the exact language of Claim 1 be literally described in the specification to satisfy the written description requirement.

Moreover, because Applicants have provided a written description that the electrode can have a thickness greater than 0.25 inch and have provided a specific example of a 0.5 inch thickness, Applicants are entitled to claim an electrode thickness of about 0.3 inch to 0.5 inch, as recited in Claim 1. See In re Wertheim, 191 USPQ 90, 98 (CCPA 1976).

The Official Action provided no reasoning concerning why the specification would not have reasonably conveyed to one having ordinary skill in the art that Applicants were in possession of the subject matter recited in Claim 1, and particularly an electrode thickness of about 0.3 inch to 0.5 inch. The Patent Office is required to give reasons why a description that is not verbatim with subject matter being claimed is insufficient. In re Wertheim, 191 USPQ at 98. As further stated in In re Marzocchi, 169 USPQ 367, 370 (CCPA 1971):

. . . it is incumbent upon the Patent Office, whenever a rejection on this basis is made, to explain why it doubts the truth or accuracy of any statement in a supporting disclosure and to back up such assertions of its own with acceptable evidence or reasoning which is inconsistent with the contested statement. Otherwise, there would be no need for the applicant to go to the trouble and expense of supporting his presumptively accurate disclosure.

For the above reasons, it is respectfully submitted that the specification provides a written description of the subject matter recited in Claim 1 that meets the requirements of 35 U.S.C. § 112, first paragraph. Thus, withdrawal of the rejection is respectfully requested.

Claims 1-10, 21-23 and 25-30 were rejected in the Official Action under 35 U.S.C. § 112, second paragraph. The reasons for the rejection are stated at page 3 of the Official Action. Claims 2, 22 and 26 have been canceled. The rejection is respectfully traversed for the following reasons.

It is asserted in the Official Action that the phrase "at least about" renders Claim 1 indefinite. This phrase has been deleted in Claim 1. Accordingly, withdrawal of the rejection is respectfully requested.

Claims 1, 5-7 and 30 were rejected in the Official Action under 35 U.S.C. § 103(a) over JP 2-20018 ("Murai"). The reasons for the rejection are stated at page 4 of the Official Action.

Claim 1 has been amended to incorporate the features of Claim 2. Accordingly, this rejection is moot.

Claims 1-3, 5-7, 27 and 30 were rejected in the Official Action under 35 U.S.C. § 103(a) over U.S. Patent No. 5,993,597 to Saito et al. ("Saito"). The reasons for the rejection are stated at pages 5-6 of the Official Action. Claim 2 has been canceled. The rejection is respectfully traversed for the following reasons.

Saito fails to suggest the combination of features recited in Claim 1. It is acknowledged in the Official Action that Saito fails to disclose an electrode having a thickness of at least 0.3 inches. However, the Official Action asserts that this omission is *prima facie* obvious. Applicants respectfully disagree with this assertion.

Saito fails to suggest an electrode thickness of about 0.3 inch to about 0.5 inch, as recited in Claim 1. For example, Saito discloses Example 1 at column 3 in which a silicon

sheet was machined into a disc shape having a thickness of 5 mm, i.e., a thickness less than 0.2 inch and which is thinner than a conventional electrode thickness of 0.25 inch. The disc-shaped silicon sheet was then immersed in hydrofluoric acid to chemically etch the sheet. Applicants submit that one having ordinary skill in the art would have understood that the chemical etching treatment removed material from the as-machined silicon sheet, thus decreasing its thickness to less than 5 mm. Saito does not suggest an electrode thickness greater than 5 mm.

Furthermore, as explained above, the present specification discloses that a low resistivity electrode can reduce center-to-edge temperature variation across the electrode, thereby providing better process uniformity, and that making the electrode thicker than a conventional electrode thickness enhances such reduction of the center-to-edge temperature variation across the electrode. Thus, the specification discloses that the combination of a silicon electrode thickness of about 0.3 inch to 0.5 inch, and an electrical resistivity of less than 1 ohm-cm, as recited in Claim 1, provides the unexpected advantage of reducing the center-to-edge temperature variation across the electrode to an enhanced degree. Such an improvement is not suggested by Saito.

Saito does not suggest that the electrical resistivity of the disclosed silicon electrode affects the center-to-edge temperature variation across the electrode, or that making the electrode thickness greater than that of a conventional electrode thickness enhances reduction of the center-to-edge temperature variation across the electrode. In fact, Saito's electrode is thinner than a conventional 0.25 inch electrode. Saito does not suggest that a silicon electrode having a thickness of about 0.3 inch to 0.5 inch enhances reduction of the

center-to-edge temperature variation across the electrode as compared to an electrode having a conventional thickness, and thus as compared to an electrode having a less than conventional thickness of at most 5 mm, as disclosed by Saito. Thus, Saito provides no motivation to modify the silicon electrode to achieve the combination of features recited in Claim 1, including an electrode thickness of about 0.3 inch to 0.5 inch. Therefore, Claim 1 is patentable over Saito.

Dependent Claims 3, 5-7, 27 and 30 are also patentable over Saito for at least the same reasons as those for Claim 1. Therefore, withdrawal of the rejection is respectfully requested.

Claim 4 was rejected in the Official Action under 35 U.S.C. § 103(a) over Murai or Saito in view of U.S. Patent No. 5,853,523 to Machida et al. ("Machida") or U.S. Patent No. 5,074,456 to Degner et al. ("Degner"). The reasons for the rejection are stated at page 6 of the Official Action. The rejection is respectfully traversed for the following reasons.

Because the subject matter of non-rejected Claim 2 has been incorporated into Claim 1, the alternative rejection over Murai in view of Machida or Degner is moot.

Furthermore, neither Machida nor Degner cures the deficiencies of Saito with respect to the subject matter of Claim 1. As mentioned above, the low resistivity silicon electrode recited in Claim 1 having an electrical resistivity of less than 1 ohm-cm and a thickness of about 0.3 inch to 0.5 inch can reduce the center-to-edge temperature variation across the electrode to an enhanced degree. The applied references fail to suggest this advantage. Thus, dependent Claim 4 is also patentable over the applied references for at

least the same reasons as for Claim 1. Therefore, withdrawal of the rejection is respectfully requested.

Claims 8-9, 21 and 28-29 were rejected in the Official Action under 35 U.S.C. § 103(a) over Murai in view of Degner or U.S. Patent No. 6,073,577 to Lilleland et al. ("Lilleland"). The reasons for the rejection are stated at pages 6-7 of the Official Action. This rejection is moot for reasons stated above.

Claims 8-10, 21-23 and 28-29 were rejected in the Official Action under 35 U.S.C. § 103(a) over Saito in view of Degner or Lilleland. The reasons for the rejection are stated at pages 7-10 of the Official Action. Claim 22 has been canceled. The rejection is respectfully traversed for the following reasons.

Degner and Lilleland fail to cure the deficiencies of Saito with respect to the low resistivity silicon electrode recited in Claim 1. Particularly, neither Degner nor Lilleland suggests modifying Saito to provide a silicon electrode having both an electrical resistivity and thickness as recited in Claim 1. Nor is there any suggestion in the cited references that the claimed combination would result in improved reduction of center-to-edge temperature variation in a silicon electrode. Thus, Claim 1 and dependent Claims 8-10, 21, 23 and 28-29 are patentable over the cited references. Therefore, withdrawal of the rejection is respectfully requested.

Claim 25 was rejected in the Official Action under 35 U.S.C. § 103(a) over Murai in view of Degner. The reasons for the rejection are stated at page 10 of the Official Action. This rejection is moot for reasons stated above.

Claims 25 and 26 were rejected in the Official Action under 35 U.S.C. § 103(a) over Saito in view of Degner. The reasons for the rejection are stated at pages 10-11 of the Official Action. Claim 26 has been canceled. The rejection is respectfully traversed for the following reasons.

As explained above, Degner fails to cure the deficiencies of Saito with respect to Claim 1. Accordingly, withdrawal of the rejection of dependent Claim 25 is respectfully requested.

For the foregoing reasons, withdrawal of the rejections and prompt allowance of the Application are respectfully requested.

Respectfully submitted,

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Attachment to Amendment After Final Rejection dated October 28, 2002

Marked-up Claims 1, 3, 10, 23, 27 and 30

1. (Amended) A low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber used in semiconductor substrate processing, comprising:

a silicon electrode comprising a showerhead electrode having a plurality of gas outlets arranged to distribute process gas in the plasma reaction chamber during use of the showerhead electrode, the electrode having a thickness of [at least] about 0.3 inch to 0.5 inch and an electrical resistivity of less than 1 ohm-cm, the electrode having an RF driven or electrically grounded surface on one side thereof, the surface being exposed to plasma in the plasma reaction chamber during use of the electrode.

3. (Amended) The electrode of Claim [2] 1, wherein the gas outlets have diameters of 0.020 to 0.030 inch and the gas outlets are distributed across the exposed surface.

10. (Amended) A plasma reaction chamber including the showerhead electrode of Claim [2] 1, the showerhead electrode being bonded or clamped to a temperature-controlled member in an interior of the plasma reaction chamber, the temperature-controlled member including a gas passage supplying a process gas to the showerhead electrode, the temperature-controlled member including a cavity and at least one baffle plate located in the cavity, the gas passage supplying process gas so as to pass through the baffle prior to passing through the showerhead electrode.

Attachment to Amendment After Final Rejection dated October 28, 2002

Marked-up Claims 1, 3, 10, 23, 27 and 30

23. (Amended) The electrode of Claim [22] 21, wherein the backing plate includes gas distribution holes communicating with the gas outlets in the electrode.
27. (Amended) The electrode of Claim [2] 1, wherein the gas outlets comprise ultrasonically drilled holes.
30. (Amended) The electrode of Claim 1, having a thickness of about [0.3] 0.375 to 0.5 inch.